

**ALASKA DEPARTMENT OF ENVIRONMENTAL CONSERVATION
AIR PERMITS PROGRAM**

TECHNICAL ANALYSIS REPORT
For Air Quality Control Minor Permit AQ0227MSS05

TDX North Slope Generating, Inc.
Deadhorse Power Plant

**ADD A TURBINE, TWO ENGINES AND REVISE OWNER REQUESTED
LIMITS**

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ABBREVIATIONS/ACRONYMS

AAC	Alaska Administrative Code
ACMP	Alaska Coastal Management Plan
ADEC	Alaska Department of Environmental Conservation
AS	Alaska Statutes
ASTM	American Society of Testing and Materials
CEMS	Continuous Emission Monitoring System
C.F.R.	Code of Federal Regulations
COBC	Compliance Order by Consent
EPA	Environmental Protection Agency
NA	Not Applicable
NESHAPS	National Emission Standards for Hazardous Air Pollutants
NSPS	New Source Performance Standards
ORL	Owner Requested Limit
PSD	Prevention of Significant Deterioration
PTE	Potential to Emit
RM	Reference Method
TAR	Technical Analysis Report
TBD	To Be Determined

Units and Measures

gr./dscf	grains per dry standard cubic feet (1 pound = 7,000 grains)
dscf	dry standard cubic foot
gph	gallons per hour
kW	kiloWatts ¹
lbs	pounds
mmBtu	million British Thermal Units
ppm	parts per million
ppmv	parts per million by volume
tph	tons per hour
tpy	tons per year
wt%	weight percent

Pollutants

CO	Carbon Monoxide
HAPS	Hazardous Air Pollutants
H ₂ S	Hydrogen Sulfide
NO _x	Oxides of Nitrogen
NO ₂	Nitrogen Dioxide
NO	Nitric Oxide
PM-10	Particulate Matter with an aerodynamic diameter less than 10 microns
SO ₂	Sulfur Dioxide
VOC	Volatile Organic Compound

Permit Specific

DPP	Dead Horse Power Plant
EVP	Enviroplan Consulting

¹ kW refers to rated generator electrical output rather than engine output

1.0 Introduction

This Technical Analysis Report (TAR) provides the Alaska Department of Environmental Conservation's (Department's) basis for issuing Air Quality Control Minor Permit AQ0227MSS05 to TDX North Slope Generating, Inc. (TDX) for the Deadhorse Power Plant (DPP). In this minor permit, the Department authorizes the installation and operation of a new natural gas-fired Solar Taurus T-60 Turbine (Emission Unit (EU) 11), one new natural gas-fired reciprocating engine (emergency generator EU 12), and one new diesel-fired reciprocating engine (emergency generator EU 13); removal of existing EU 7 (diesel-fired back-up generator No. 12) from the DPP source inventory; and continued operation of diesel-fired generator EU 5, which was previously planned for removal from DPP. TDX also requested a number of revisions to their existing Title I permits (Minor Permits AQ0227MSS02 and AQ0227MSS04; and Construction Permit 227CP01).

Rather than maintaining a total of four active Title I permits (the three existing permits plus Minor Permit AQ0227MSS05), the Department is instead rescinding the existing Title I permits and issuing Minor Permit AQ0227MSS05 as a comprehensive Title I permit. Minor Permit AQ0227MSS05 therefore includes the active conditions from these prior Title I permits, revised as warranted per TDX's request.

1.1 Stationary Source Description

The DPP is an existing stationary source, owned and operated by TDX North Slope Generating, Inc. The DPP is located near the Deadhorse, AK Airport. The DPP also includes equipment that is located on property leased from Norgasco, Inc. The Norgasco site is situated about three miles northeast of the airport site. TDX considers the Norgasco and Deadhorse sites as the DPP "North" and "South" Plants, respectively. The Department previously determined the North and South Plants to be a single stationary source (*i.e.*, the DPP stationary source).

The Deadhorse Power Plant is located within the North Slope Borough's coastal zone district and is subject to review under the Alaska Coastal Management Program (ACMP).

1.2 Project Description

TDX applied for Minor Permit AQ0227MSS05 (application dated April 16, 2009) for the purposes of installing and operating new combustion equipment and rescinding/revising existing permit conditions, as described below:

- Install/operate a second Solar Taurus T-60 Turbine (EU 11) at the North Plant. The second turbine will be identical to the existing turbine approved for operation at the North Plant under Minor Permit AQ0227MSS04. The new turbine will be fired using pipeline grade natural gas purchased from Norgasco.
- Install/operate one new natural gas-fired reciprocating engine (EU 12) and one diesel-fired reciprocating engine (EU 13). EU 12 is a 574-kilowatt Cummins GTA28 engine that will be used as the South Plant Emergency Generator, and will replace EU 7 which is being removed from the source (see below). EU 13 is a 300-kilowatt Cummins NTA855 engine that will be used as the North Plant Emergency Generator.

Note: As described in the April 2009 minor permit application, TDX originally planned to install a 250-kilowatt natural gas-fired engine (EU 13) to provide power to the North Plant in the event of a power outage. On October 27, 2009, TDX informed the Department that

they instead plan to install a 300-kilowatt diesel-fired engine to provide emergency power in the event of a power outage at the North Plant. As such, the description of EU 13 reflects a Cummins NTA855 300-kilowatt diesel-fired reciprocating engine. The PTE and assessable PTE likewise reflect the 300-kilowatt Cummins engine.

- Remove EU 7 (diesel-fired back-up generator No. 12) from service
- Retain EU 5 (diesel-fired generator No. 6) at DPP. TDX previously requested, and Minor Permit AQ0227MSS04 approved, removal of EU 5 within 365 days of initial startup of EU 10 (*i.e.*, existing Solar Taurus T-60 Turbine at the North Plant). TDX has re-evaluated source operations and determined that they need to operate EU 5 to startup EU 10 and black-start situations for existing reciprocating engines EUs 1a, 2, 3, and 4a. Consequently, TDX has requested the following changes to Permit AQ0227MSS04:
 - Rescind Condition 1.2 of Minor Permit AQ0227MSS04 and retain EU 5 in the DPP emissions inventory.
 - TDX is requesting a plant-wide owner requested limit (ORL) for nitrogen oxides (NO_x) emissions that will replace the existing annual diesel fuel limit and NO_x emission limits in Permits 227CP01 and AQ0227MSS02.
 - Reestablish the stationary source wide ORL for NO_x emissions. The Department determined in Minor Permit AQ0227MSS04 that, upon removal of EU 5, the NO_x emissions were less than the PSD major source threshold of 250 tons per year (tpy). As a result, Minor Permit AQ0227MSS04 rescinded the previously established NO_x PSD avoidance ORL upon EU 5 decommissioning. Since EU 5 will not be decommissioned, TDX has requested the NO_x ORL for PSD avoidance be reestablished, but eliminate unit specific annual operating hour and diesel fuel consumption limits. TDX proposes to demonstrate NO_x ORL compliance by continuing to monitor, record and report total fuel usage and operating hours, but without the unit specific restrictions (similar to the existing CO ORL established in Minor Permit AQ0227MSS04). See Section 2.2.1.
 - TDX is requesting to include the second gas turbine EU 11 in the existing carbon monoxide (CO) ORL in Condition 10.1 of Minor Permit AQ0227MSS04.

The Department's finding regarding this application are listed in Section 1.4.

1.3 Emissions Summary and Permit Applicability

TDX provided an "Emission Summary Form" in their April 16, 2009 application. TDX made the following assumptions in calculating the PTE for proposed Solar Taurus Turbine, EU 11. Minor Permit AQ0227MSS04 reflects these same assumptions for identical existing turbine, EU 10.

1. Ambient temperature-adjusted emission factors for NO_x, and Volatile Organic Compounds (VOCs). Emissions from gas-fired turbines vary with ambient temperature. Because the Solar turbine will not have inlet heating to minimize these variations, TDX used the following approach to estimate the annual emissions. TDX obtained hourly temperature readings from meteorological data gathered at BP's Northstar and Milne Point during 2001 through 2004 to determine how often the ambient temperature falls within select ranges. TDX then used these temperature

- frequencies to weight the temperature-specific emission rates. TDX calculated emissions with vendor data at 100, 75 and 50 percent loads.
2. The PTE calculations for PM-10, SO₂ and VOC are based on 8,760 hours of operation (unrestricted) and did not take into consideration the NO_x and CO ORLs.
 3. The Department evaluated NO_x and VOC emissions at various loads and concluded the following:
 - Maximum NO_x emissions occur at 100 percent load.
 - Maximum VOC emissions occur at 40 percent load, but the VOC emissions of the Deadhorse Power Plant are well below the PSD major threshold for VOC if the Solar Taurus Turbines are operated continuously at 40 percent load.
 4. The Solar Taurus Turbines will be operated as the base electric load generating unit for Deadhorse. Because most of the buildings in Deadhorse are heated by electrical heaters, the winter demand for electric power generally exceeds 7 megawatts (MW). The Solar Taurus Turbines will operate in the winter, with the gas-fired or diesel-fired reciprocating engines at the existing Deadhorse Power Plant handling load swings. In the summer, the Solar Taurus Turbines will be shut down and the gas-fired reciprocating engines at the existing Deadhorse Power Plant will meet the demand for electricity in Deadhorse. Therefore, TDX anticipates not operating the Solar Taurus Turbines at loads less than 50 percent.
 5. Particulate Matter with an aerodynamic diameter less than 10 microns (PM-10) emissions were calculated using AP-42 emission factors.
 6. Sulfur Dioxide (SO₂) emissions were calculated by mass balance with a hydrogen sulfide (H₂S) concentration of 100 parts per million volume² (ppmv).

TDX made the following assumptions in calculating the PTE for the gas-fired generator (EU 12) and the diesel-fired generator (EU 13). Minor Permit AQ0227MSS04 reflects these same assumptions for the similar existing diesel and gas fired generators.

1. NO_x and VOC emissions were calculated using highest emission rate regardless of load vendor data.
2. PM-10 emissions were calculated using AP-42 emission factors.
3. SO₂ emissions were calculated by mass balance with hydrogen sulfide (H₂S) concentration of 100 ppmv for gas-fired units and 0.2 weight percent Sulfur (wt% S) for diesel-fired units.
4. The PTE calculations for PM-10, SO₂ and VOC are based on 500 hours of operation and did not take into consideration the stationary source wide cap for NO_x and CO.

TDX calculated the VOC emissions for the diesel storage tanks using EPA TANKS 4.0 software.

TDX did not address whether the project avoided minor permitting for PM-10 and SO₂, under the proposed stationary source wide cap for NO_x and CO. TDX calculated the PM-10 and SO₂ project emissions, presuming that EU 5 burned 0.08 MMgal/yr and EUs 12 and 13 operated only

² TDX stated in their application for Minor Permit AQ0227MSS03 that they would purchase natural gas from Norgasco. The Department contacted Norgasco at that time by phone and was told their natural gas H₂S concentration is approximately 25 ppmv. The Department concluded that TDX's assumption of H₂S concentration of 100 ppmv is conservative and therefore acceptable.

500 hr/yr. However, the NO_x and CO ORLs proposed by TDX do not have limits for individual units. TDX should have considered all combinations of emission unit operation (while satisfying the ORLs) when computing the PTE of PM-10 and SO₂ for this project. Therefore, the Department recalculated the PTE of PM-10, SO₂ and VOC for this project. Refer to Appendix A for a discussion of the analysis conducted by the Department. It is noted that, while TDX requested rescinding of prior unit-specific restrictions, the Department has denied this request for air quality protection purposes (see Section 2.2.1).

Table 1 shows the change in PTE, for minor permit applicability, as described in 18 AAC 50.502(c)(3). As shown in Table 1 this project is classified under 18 AAC 50.502(c)(3) for emissions of NO_x.

Table 2 shows the stationary source's assessable emissions with the requested modifications.

Table 1 – Minor Permit Applicability, tpy

Pollutant	NO _x	CO	PM-10	SO ₂	VOC
Existing DPP PTE ^a	165.6	240.1	13.8 ^b	9.9	119.0
PTE with AQ0227MSS05 modifications (including ORLs)	242.6	240.1	11.77 ^c	15.51 ^c	101.50 ^d
Net Change in PTE	77.0	0.0	-2.03	5.61	-17.5
Minor Permit Threshold	10	N/A	10	10	N/A
Minor Permit?	Yes	N/A	No	No	N/A

Table Notes

a - Taken from Table 2 of the Technical Analysis Report for Minor Permit AQ0227MSS04.

b - In the PTE calculations submitted by TDX, the Permittee indicates that the PM-10 PTE was incorrectly calculated for AQ0227MSS04. The PM-10 PTE was revised from 17.5 tpy to 13.8 tpy.

c - PTE was recalculated by the Department taking into consideration the NO_x ORL. Refer to Appendix A.

d - PTE was recalculated by the Department taking into consideration the NO_x and CO ORLs.

Table 2 - TDX Deadhorse Power Plant Assessable Emissions

Pollutant	NO _x	CO	PM-10	SO ₂	VOC	Total Assessable PTE
DPP PTE (with AQ0227MSS05 modifications, including ORLs)	243	240	12	16	101	612 ^a

Table Notes

a - The Total Assessable PTE was recalculated by the Department taking into consideration the NO_x and CO ORLs.

1.4 Department Findings

1. The DPP is not a PSD-major stationary source because the existing PTE does not exceed 250 tpy for any pollutant (see Table 1) and the PTE will remain below the PSD major thresholds after the issuance of Minor Permit AQ0227MSS05 (see Table 2).
2. A minor permit is required under 18 AAC 50.502(c)(3) because the increase in project emissions for NO_x is greater than 10 tons per year (see Table 1).
3. A minor permit is required under 18 AAC 50.508(6) because TDX is requesting changes to terms and conditions of a Title I permit (Construction Permit 227CP01 and Minor Permits AQ0227MSS02 and AQ0227MSS04).
4. TDX will not need additional limits to avoid minor permitting for PM-10 and SO₂. Under the stationary source wide cap for NO_x and CO, the emissions increase for PM-10 and SO₂ are inherently less than minor permitting thresholds of 10 tpy listed in 18 AAC 50.502(c)(3).
5. TDX requested the Department incorporate the provisions of this minor permit into the Title V operating permit as an administrative revision. However, TDX does not have an operating permit at this time. TDX did not submit a timely application for the operating permit renewal and therefore, cannot use the permit shield to operate under the expired Operating Permit AQ0227TVP01. While the request to incorporate the provisions of this minor permit into the operating permit is moot, the periodic monitoring, record keeping and reporting (MR&R) that would be necessary for a Title V operating permit under 40 CFR 71.7(d) for state emissions standards has been included in the minor permit (see discussion, Section 2.2.3).
6. The existing Solar turbine approved under Minor Permit AQ0227MSS04 (EU 10) and the new Solar turbine approved under this minor permit (EU 11) are subject to federal New Source Performance Standards, Subpart GG, as adopted at 18 AAC 50.040(a)(2)(V). The Department has included the NSPS requirements and periodic monitoring requirements. Even though the inclusion of NSPS requirements is not required for permits issued under 18 AAC 50.502(c)(3) or 508(6), the Department included the applicable NSPS requirements because the DPP is classified under 18 AAC 50.326(a) and 40 CFR 71.3(a) and is currently operating out of compliance with such regulations that require the Permittee to obtain a Title V Operating Permit. Such Operating Permit would contain applicable requirements including NSPS Subpart GG requirements for EU 10 and 11.

The Department entered into a Compliance Order by Consent (COBC), which was signed on January 15, 2010, to bring the DPP into compliance with 18 AAC 50.326(a) and 40 CFR 71.3(a) adopted by reference under 18 AAC 50.040(j). The Permittee must comply with preliminary Minor Permit AQ0227MSS05 (Exhibit to COBC) until a minor permit is issued and a Title V Operating Permit is issued.
7. The TDX Deadhorse Power Plant stationary source is located in the North Slope Borough. The project is consistent with the Alaska Coastal Management Program (ACMP) through AS 46.40.040(b)(1). The Department did not notify the local district and resource agencies of the permit action to request additional ACMP review because the North Slope Borough Coastal District plan does not have an enforceable policy in effect at this time. The Department is providing opportunity to comment on the

preliminary permit during the public comment period. In addition, the resource agencies had the opportunity to comment on the preliminary permit during the public notice period.

2.0 Permit Conditions

2.1 Requirements for all Minor Permits.

As described in 18 AAC 50.544(a)(1), each minor permit issued under 18 AAC 50.542 must identify the stationary source, the project, the Permittee, and contact information. The permit cover page identifies the stationary source, the project, Permittee and contact information.

As required under 18 AAC 50.544(a)(2), the minor permit must contain the fee requirements of 18 AAC 50.400 – 18 AAC 50.499. As shown in Table 2 the assessable emissions are 612 tpy after the issuance of Minor Permit AQ0227MSS05.

The requirements in 18 AAC 50.544(a)(3) do not apply to this permit since the Department did not establish any conditions under 18 AAC 50.201.

As described in 18 AAC 50.544(a)(4), the permit contains owner requested limits under 18 AAC 50.225 that apply to this stationary source. These limits are in Section 4 of the permit.

2.2 Requirements for a Minor Permit under 18 AAC 50.502(c) for Air Quality Protection

As required under 18 AAC 50.544(c), each minor permit classified under 18 AAC 50.502(c) must contain

- (1) terms and conditions as necessary to ensure that the source will not cause or contribute to a violation of an ambient standard. See Section 2.2.1 below.
- (2) performance tests for state emission limits. The Department has included the necessary performance test in Section 5 of the permit. See Section 2.2.3 for description of the basis for performance tests, and
- (3) maintenance requirements according to the manufacturer's or operator's maintenance procedures. As required in 18 AAC 50.544(c)(3), the permit includes a condition for maintenance of equipment according to manufacturer's or operator's maintenance procedures to ensure compliance with 18 AAC 50 in Section 6 of the permit.

2.2.1 Ambient Air Quality Analysis

The project requires an ambient NO₂ analysis per 18 AAC 50.540(c)(2)(A), because the increase in NO_x emissions from the modification is greater than 10 tons per year (see Table 1). Ambient analysis for PM-10 and SO₂ are not required because the increase in emissions from the project is less than 10 tons per year for each pollutant.

Additionally, a minor permit is required under 18 AAC 50.508(6) because TDX is requesting changes to terms and conditions of a Title I permit (Construction Permit 227CP01 and Minor Permits AQ0227MSS02 and AQ0227MSS04). As described in Section 1.2, this includes TDX's request to revoke both the previously established source-wide diesel fuel use restriction (*i.e.*, 300,000 gallons/year) and the annual operating hour restriction on EU 7 (250 hours/year). These permit restrictions were established to protect the NO₂ ambient air quality standards and maximum allowable increases (increments). This request notwithstanding, TDX did not provide

an ambient analysis to determine the effect of revoking these permit terms on stationary source emissions, as required pursuant to 18 AAC 50.540(k)(3). Consequently, the Department has denied TDX's request to eliminate these two permit restrictions which are retained in this minor permit (see additional discussion in Section 0, Items 1 and 3).

In accordance with 18 AAC 50.540(c)(2)(A), TDX submitted an ambient air quality analysis to demonstrate that the impacts associated with the DPP modification described in Section 1.2 (*i.e.*, installation of EU 11, 12, and 13) comply with the NO₂ Alaska Ambient Air Quality Standard (AAAQS) listed in 18 AAC 50.010 and the NO₂ increment listed in 18 AAC 50.020. TDX included the ambient analysis in their April 2009 application; with supplemental modeling information submitted to the Department on March 1, 2010. TDX proposed an annual operating restriction of 250 hours/year for EU 13 for air quality protection purposes. This restriction is included in the minor permit.

The Department's contractor, Enviroplan Consulting (Enviroplan), reviewed TDX's analysis on behalf of the Department. Enviroplan's findings are provided in Appendix B of this TAR. Based on Enviroplan's findings, the Department has concluded that TDX adequately demonstrated compliance (through modeling) with the NO₂ ambient air quality standard.

2.2.2 Requirements Under 18 AAC 50.544(c)(1)(B) for Sampling Emissions

The Department has determined that it is not necessary to require source testing for the proposed Solar Turbine (EU 11) to verify the CO and NO_x emission factors or opacity. No testing is required because Minor Permit AQ0227MSS04 contained a one-time testing requirement for an identical unit (EU 10) to verify the CO and NO_x emission factors and opacity.

The Permittee conducted a source test on April 10, 2009 to verify the CO and NO_x emission factors and to determine opacity for EU 10. The test results indicated that for six test runs conducted the measured CO and NO_x emission factors were each lower than the manufacturer's guaranteed emission factors. As such, since the manufacturer's CO and NO_x emission factors are more conservative than the tested emission factors and since the CO and NO_x emission factors provided by the manufacturer cover a variety of turbine loads and ambient temperature ranges, the manufacturer's CO and NO_x emission factor's will be used to calculate the emissions (see Table 3 of the permit) to demonstrate compliance with the limits.

Minor Permit AQ0227MSS04 required TDX to conduct a winter performance test on EU 10, with *winter* defined as the period between December 1st to April 1st. TDX had originally scheduled the source test on March 19, 2009; however, TDX indicated that high winds and temperatures, that were consistently in the range of 20 to 30 degrees below zero degrees Fahrenheit, made it unsafe to conduct the source test on the scheduled date. Even though TDX was not able to perform the source test on EU 10 between December 1st and April 1st, TDX was able to test this unit on a day when turbine inlet temperatures were below zero degrees Fahrenheit.

TDX requested that the Department include a condition in the minor permit to demonstrate particulate emission limit compliance with 18 AAC 50.055(b) for EU 13 through source testing. TDX has requested such since it is not possible to utilize U.S. EPA AP-42 emission factors to demonstrate compliance with the 0.05 grains per cubic foot of exhaust gas (corrected to standard conditions and averaged over three hours) state standard in 18 AAC 50.055(b) for EU 13. The

Department has included related testing and monitoring, recordkeeping, and reporting (MR&R) requirements in the minor permit.

In accordance with the above and prior approvals for this source, TDX shall utilize vendor emission factors specified in the minor permit to determine compliance with the ORLs established for this stationary source. This notwithstanding, the minor permit retains a previously established condition requiring all emission units be tested if the actual 12-month rolling emission rate (NO_x or CO) exceeds 90 percent of the major source emission rate (*i.e.*, 90 percent of 250 tpy, or 225 tpy).

2.2.3 State Emission Standards

TDX requested that the Department incorporate this minor permit into the Title V operating permit as an administrative amendment as described in 18 AAC 50.326(c)(2). However, TDX does not have an operating permit at this time. TDX's initial operating permit AQ0227TVP01 expired on July 29, 2008. TDX failed to submit a timely application for an operating permit renewal in order for TDX to operate under a permit shield. While TDX's request therefore is moot, the Department included the periodic monitoring, record keeping, and reporting (MR&R) that would be necessary for a Title V operating permit under 40 CFR 71.7(d) for state emissions standards. Since the Permittee must comply with preliminary Minor Permit AQ0227MSS05 (Exhibit to COBC signed January 15, 2010) until a Title V Operating Permit is issued, inclusion of the periodic MR&R will provide the required MR&R for TDX to operate under the COBC.

The following sections pertain to new emission units EUs 11, 12 and 13. The active MR&R requirements for existing emission units 1a, 2, 3, 4a, 5 and 6 are carried-forward in Minor Permit AQ0227MSS05.

2.2.3.1 Visible Emission Standard

EUs 11, 12, and 13 are fuel-burning equipment subject to the state standard for visible emissions in 18 AAC 50.055(a)(1).

TDX did not provide vendor data showing that EUs 11 and 12 will comply with the state standard. TDX stated in the application that although vendor information does not include visibility information, TDX's experience with these types of units has shown compliance with this state standard when the equipment is properly operated and maintained. The Department's experience concurs that these types of units that combust natural gas have shown compliance with this state standard. The minor permit does not contain an initial compliance demonstration for visible emissions for the gas-fired units.

Similarly, TDX did not provide an initial compliance demonstration for EU 13 that it will comply with the state standard for visible emissions. As such, an initial visible emissions compliance demonstration is included in the permit for diesel fired EU 13 for Title 1 purposes. Periodic MR&R requirements have been added to the permit to ensure that the new units comply with the state opacity standard on a continuous basis.

2.2.3.2 Particulate Matter Standard

EUs 11, 12, and 13 are fuel-burning equipment subject to the state standard for PM emissions of 0.05 grains per dry standard cubic foot of exhaust gas (gr./dscf) in 18 AAC 50.055(b)(1).

TDX provided an initial compliance demonstration in the application for EUs 11 and 12. TDX used the AP-42 PM emission factor of 6.6×10^{-3} pounds per Million British Thermal Unit

(lb/MMBtu), an F factor of 30,854 dscf/MMBtu and a dry basis exhaust oxygen content of 15 percent for EU 11. Additionally, TDX used the AP-42 PM emission rate of 1.0×10^{-2} lb/MMBtu, an F factor of 14,111.6 dscf/MMBtu and a dry basis exhaust oxygen content of 8 percent for EU 12. For EU 12 TDX calculated PM emissions using AP-42 emission factors and determined that PM emissions will be 0.001 gr/dscf for EU 11 and 0.005 gr/dscf for EU 12. This PM emission rates for EU 11 and 12 are below the applicable PM standard of 0.05 gr./dscf.

According to TDX, the only information available for PM emissions from EU 13 is Table 3.3-1 of AP-42. When the PM emissions from Table 3.3-1 of AP-42 are used to demonstrate compliance with the State of Alaska grain-loading standard, compliance cannot be demonstrated for engines that are rated at less than 600 hp. However, experience with other engines in this size range has shown that diesel-fired reciprocating engines that are rated at less than 600 hp will comply with the grain-loading standard based upon engine specific PM emissions information or the results from PM emission testing. TDX has requested that the Department include a condition in the minor permit that allows TDX to demonstrate initial compliance for EU 13 with 18 AAC 50.055(b). Also, periodic MR&R requirements have been added to the permit as requested by the Department's compliance group to incorporate in the COBC as described in Department Findings #6. These requirements to ensure that the new units comply with state PM standard on a continuous basis are included in Section 5 of the permit.

2.2.3.3 Sulfur Dioxide Standard

EUs 11, 12, and 13 are fuel-burning equipment subject to state standards for SO₂ in 18 AAC 50.055(c).

TDX provided an initial compliance demonstration in the application for EUs 11, 12, and 13. TDX used a heating value of 990 Btu/scf, an F factor of 8,710 dscf/MMBtu and a dry basis exhaust oxygen content of zero percent for EUs 11 and 12. TDX showed that the H₂S concentration is lower than 4,355 ppmv and EUs 11 and 12 are able comply with the state standard. TDX has proposed to burn fuel gas with a H₂S content of 100 ppmv or less. The Department has included a condition in Section 3 of the permit, that TDX can burn only fuel gas with H₂S content of 100 ppmv or less.

TDX provided a revised compliance demonstration for EU 13 on October 27, 2009 when they indicated that they plan to install a diesel reciprocating engine instead of a natural gas-fired reciprocating engine as initially planned. TDX demonstrated that diesel fuel, with less than 0.74 percent % sulfur by weight, will be able to comply with the 500 ppm state standard for SO₂. TDX has proposed to burn diesel fuel with sulfur content less than 0.2 percent by weight. The Department has included a condition in Section 3 of the permit, that TDX can burn only fuel oil with sulfur content less than 0.2 percent. As such, TDX is able to comply with the state standards for SO₂ in 18 AAC 50.055(c).

The Department has included MR&R requirements for fuel gas H₂S content and fuel oil sulfur content in Section 3 of the permit to ensure compliance with the state standards in 18 AAC 50.055(c).

2.3 Requirements for a Minor Permit under 18 AAC 50.508(6) that Revises or Rescinds the Conditions of a Previous Title I Permit

As required in 18 AAC 50.544(i), this minor permit contains terms and conditions as necessary to ensure that the Permittee will construct and operate the proposed emission units (EUs 11, 12,

and 13) in accordance with 18 AAC 50. In this minor permit classified under 18 AAC 50.508(6), the Department has revised the emission unit inventory of Minor Permit AQ0227MSS04, and rescinded or revised conditions in Minor Permits AQ0227MSS02 and AQ0227MSS04, and Construction Permit 227CP01. This minor permit ensures that the Permittee will continue to operate the source in accordance with Chapter 50 as described in this section.

In addition, the project requires a determination of the effect of revising or revoking permit terms or conditions on emissions, per 18 AAC 50.540(k)(3). However, since this minor permit revises existing ORL conditions to simply include the new emission units and carries-forward prior unit-specific permit restrictions established for air quality protection (see Section 2.3.1 below), no ambient demonstration is required under 18 AAC 50.540(k)(3). Also see Section 2.2.1.

2.3.1 Title I Permit Conditions Revised

TDX requested a number of changes to their existing Title I permits (227CP01, AQ0227MSS02 and AQ0227MSS04). As indicated in Section 1.0, the Department is rescinding the existing permits upon issuance of this Minor Permit AQ0227MSS05. The active conditions from these prior Title I permits have been revised as necessary and included in Minor Permit AQ0227MSS05. The following summarizes TDX's requested revisions to these rescinded permits, as requested by TDX in the April 2009 minor permit application (see Section 1.2 above):

Construction Permit 227CP01

1. The Department has rescinded Conditions 7 and 8. The notification requirements are obsolete since they relate to regulations that the Department repealed in October 2004.
2. TDX requested that Condition 11.1b be rescinded. Condition 10.2 of AQ0227MSS02 already rescinded Condition 11.1b upon removal of EUs 1 and 4 (which previously occurred).
3. TDX requested that Condition 11.1c be rescinded since EU 7 will be removed from service. The Department therefore did not include EU 7 in Minor Permit AQ0227MSS05. However, since TDX plans to utilize EU 12 as a replacement-in-kind for EU 7, the effect of Condition 11.1c must either be maintained or reassessed under 18 AAC 50.540(k)(3). The Department originally established the 250 hour per year (12-month) restriction in Condition 11.1c of Construction Permit 227CP01 to protect the annual average NO₂ increment. Since TDX did not provide an ambient air analysis to assess the effect of removing the EU 7 operating restriction on the NO₂ increment, the Department has retained a pro-rated operating restriction on EU 12, determined as follows: the NO_x emission rate for EU 7 is 5.16 lb/hour (according to the 227CP01 application and TAR); the NO_x emission rate for EU 12 is 1.80 lb/hour (according to the AQ0227MSS05 application); and the 250 hour/year restriction on EU 7 is pro-rated to 700 hours per year for EU 12.

4. TDX requested that Condition 12 be rescinded because EUs 1 and 4 have been removed from service and EU 7 will be removed from service; and the total on-site diesel fuel consumption limit to restrict source NO_x emissions was revised in Minor Permit AQ0227MSS02. The Department maintained the annual diesel fuel consumption limit in Minor Permit AQ0227MSS05 for purposes of air quality protection (see related discussion in Item 9 below).
5. Condition 17 is rescinded because the specified ORL to limit NO_x emissions to avoid PSD-major stationary source classification is replaced in this permit by the revised NO_x emissions ORL that includes the new emission units at this stationary source.
6. TDX requested that Condition 18 be rescinded because EUs 1 and 4 have been removed from service and EU 7 will be removed from service. Condition 19 of AQ0227MSS02 already rescinded Condition 18.
7. Conditions 10 and 11 contain the ORLs (and MR&R) to avoid PSD classification for CO and NO_x, respectively, for this stationary source. TDX requested in their April 2009 application that Condition 20.2 of Construction Permit 227CP01 (*i.e.*, requirement for NO_x emissions testing if total 12-month rolling NO_x emission rate exceeds 225 tons) be rescinded. TDX provided no substantive basis for this request; therefore, this requirement remains in the minor permit (as Condition 11.7). The Department further revised the condition as follows: Condition 11.7 requires TDX to conduct an emission source test of EUs 1a, 2, 3, 4a, 5, 6, and 10 through 13 if the total 12-month rolling NO_x emission rate exceeds 225 tons. The Department has added a requirement for TDX to conduct an emission source test of the same emission units (EUs 1a, 2, 3, 4a, 5, 6, and 10 through 13) if the total 12-month rolling CO emission rate exceeds 225 tons. The 225-ton trigger corresponds to 90% of the PSD major source thresholds. Since source-specific (test) emission factors are not used to calculate the actual emissions from all emission units, the 225-ton threshold is required to ensure that actual NO_x and CO emissions do not exceed PSD major source thresholds.

Minor Permit AQ0227MSS02

8. Condition 7 is rescinded and replaced with language that includes stack height requirements for new turbine EU 11, new engines EU 12 and 13, existing turbine EU 10, and other existing units.
9. Condition 12 is revised to remove reference to EUs 1 and 4 because these units were previously removed from the stationary source. However, the total on-site annual diesel fuel consumption limit to restrict source NO_x emissions (*i.e.*, 300,000 gallons/year) is retained in this minor permit. TDX requested the fuel usage limit be replaced in this permit by the revised stationary source NO_x emissions ORL (tpy). As discussed in the TAR to AQ0227MSS02, this fuel usage limit was established by the Department to protect the NO₂ increment. TDX did not provide a new NO₂ increment compliance demonstration to evaluate the effect of removing the diesel fuel restriction; therefore, this existing diesel fuel use restriction (applicable to EU 5 and EU 13) is retained in the minor permit for purposes of air quality protection.
10. Condition 18 is revised to reflect the NO_x emissions ORL which includes the current inventory of combustion sources as listed in this permit.

11. Condition 19 is rescinded because it simply cross-references Condition 12 which otherwise stands on its own (as revised – see Item 9 above).

Minor Permit AQ0227MSS04

12. Condition 1, Table 1 (Emission Unit Authorization) is rescinded and revised to include new EUs 11, 12, and 13; and to retain EU 5 at the stationary source.
13. Condition 1.2 is rescinded because TDX no longer plans to decommission EU 5 and Department notification of such is no longer relevant.
14. Condition 2 through 4 and 7 through 9 are rescinded because TDX no longer plans to decommission EU 5 and therefore these conditions are no longer relevant. The NO_x ORL for PSD avoidance, previously established as Condition 18 of Permit 227CP01 and revised at Condition 18 of Permit AQ0227MSS02, is retained and revised in this minor permit (see discussion in Section 2.3.2).
15. Condition 11 (Emission Factors Verification) is rescinded because TDX conducted a performance test of existing Solar turbine EU 10 on April 10, 2009 to verify the CO and NO_x emission factors and to determine opacity. The Department received a copy of the test results from TDX on June 9, 2009. This was a one-time only testing requirement. The Department has determined that a performance test is not required for new Solar Taurus turbine EU 11 to verify the CO and NO_x emission factors because EUs 10 and 11 are identical units.
16. Condition 12 is rescinded because this condition stipulated the testing methodology to be used for the winter performance test in Condition 11, which is rescinded from the permit.
17. Condition 10 is revised to remove EU 7 (diesel-fired back-up generator) from, and include new EUs 11, 12, and 13 in, the existing CO ORL to avoid classification as a PSD major stationary source. No change is made to the CO ORL emission limit of 240.1 tons per 12 month rolling period (see discussion in Section 2.3.2). However, as discussed in Section 2.2.1, the Department is including in this minor permit a restriction on the annual hours of operation for EU 12.
18. Condition 12 contains the revised NO_x ORL for the stationary source to avoid classification as a PSD major stationary source. No change is made to the NO_x ORL emission limit of 242.6 tons per 12 month rolling period (see discussion in Section 2.3.2). This NO_x ORL replaces Condition 12, 18, 19, and 20 of Minor Permit AQ0227MSS04 dated September 12, 2008.
19. Condition 14 is revised to reflect the stationary source's assessable potential to emit at 612 TPY.
20. A new permit condition (Condition 13) is added as follows: Before initial start-up, equip each of EUs 11, 12, and 13 with a dedicated hour meter to total the operating hours of the emission unit.
21. A new permit condition (Condition 5) is added as follows: The new diesel-fired emergency generator EU 13 shall be restricted to operating no more than 250 hours per twelve (12) month rolling period. This restriction was proposed by TDX for air quality protection purposes (see Appendix B).

2.3.2 Title I Permit Condition Revisions – MR&R

As required in 18 AAC 50.544(i), in each minor permit under 18 AAC 50.508(6) that revises or rescinds terms or conditions of a Title I permit, the Department will include terms and conditions as necessary to ensure that the Permittee will construct and operated the proposed stationary source or modification in accordance with 18 AAC 50. TDX has requested revisions to the existing CO and NO_x ORL conditions (see Sections 1.2, 2.2.1, 2.3.1 above). This minor permit rescinds Permits 227CP01, AQ0227MSS02 and AQ0227MSS04 and revises the ORLs and related MR&R conditions therein as follows:

- TDX requested that the new gas turbine (EU 11), one natural gas-fired reciprocating engine (emergency generator EU 12), and one diesel-fired reciprocating engine (emergency generator EU 13) be added to the existing CO ORL in Condition 10 of Minor Permit AQ0227MSS04. The CO ORL remains unchanged in this minor permit at 240.1 tons per 12 month rolling period, but the condition is revised to include EUs 11, 12, and 13 with the other existing fuel-combustion emission units.
- TDX requested a rescission of Condition 1.2 of Minor Permit AQ0227MSS04 and revision of the plant-wide ORL for NO_x emissions to replace the existing annual fuel limits and NO_x emission limit in Permits 227CP01 and AQ0227MSS02. The revised ORL will restrict NO_x emissions from the DPP to 242.6 tpy, it will include new EUs 11, 12 and 13; and it will retain previously established restrictions on diesel fuel usage (EU 5 and EU 13) and annual operating hours (EU 12) as discussed in Section 2.2.1.
- TDX requested existing MR&R condition revisions as explained below.

Solar Taurus T-60 Turbine (Emission Units 10 and 11):

TDX proposes to use the parametric monitoring approach in Minor Permit AQ0227MSS04 to estimate the NO_x and CO emissions from new Solar Turbine EU 11, in addition to existing identical Solar turbine EU 10.

In summary, Solar Taurus 60 turbines is equipped with a “lean-premixed, dry, low emission” (SoLo NO_xTM) combustion chamber. This emission control technology is functional throughout the 50 to 100 percent load range at inlet temperatures above 0°F. Standard combustion, which has higher CO and NO_x emissions, occurs when the turbine is operated under smaller loads and/or colder inlet temperatures. The turbines also use standard combustion when operated under transient (*i.e.*, variable load) conditions.

TDX will electronically capture the sixty second average load and inlet air temperature of each unit (EUs 10 and 11), during all periods of operation. They will record for each day, the minimum sixty second average load and the minimum sixty second average inlet air temperature. Recording only the minimum daily values reduces the data management burden, but still allows for manual review of the worst-case conditions.

TDX will then determine the CO and NO_x emitted during each minute using a load-specific and temperature-specific lookup tables provided in the permit, or from alternative values based on source tests. All alternative values must be approved by the Department as required in the permit. The lookup tables contain CO and NO_x emission factors provided by the vendor, which the Department converted into units of pounds per minute. The table is carried forward from Minor Permit AQ0227MSS04, Section 3. In situations where the load and/or temperature data are unknown or suspect (*e.g.*, due to

faulty monitoring equipment), TDX must estimate the one minute CO or NO_x emissions using surrogate data sets (*e.g.*, the ambient air temperature measured by the National Weather Service at Deadhorse) or the worst-case load/temperature. TDX will calculate and record the daily CO and NO_x emissions in pounds (lbs) by summing the one-minute emissions of CO and NO_x, respectively.

Example Emissions Calculation for the Solar Taurus T-60 Turbines

An example for the daily NO_x and CO emissions calculation for the Solar Taurus T-60 turbines is included below:

Turbine hourly NO_x and CO emission rates are based upon turbine inlet temperature and turbine electrical load. Assume that the turbine produces 4.0 MW for 20 hours and 3.2 MW for four hours. The inlet air temperature is 5°F for the entire day.

- Turbine is rated at 5.2 MW; Determine turbine loads.
 - $4.0 \text{ MW} \div 5.2 \text{ MW} = 0.77$ or 77% load
 - $3.2 \text{ MW} \div 5.2 \text{ MW} = 0.62$ or 62% load
- Based on turbine loads and inlet air temperatures; determine hourly turbine rates.
 - Refer to *Solar Turbine Emissions Estimates* (Table F-10 provided by TDX in the permit application)
 - 77% load, 5°F: NO_x hourly emission rates is 5.7 lb/hr and the CO hourly emission rate is 7 lb/hr (round up to 80% load and round down to 0°F)
 - 62% load, 5°F: NO_x hourly emission rates is 5.3 lb/hr and the CO hourly emission rate is 6.5 lb/hr (round up to 70% load and 0°F)
- Daily NO_x emissions from Solar turbine
 - $(20 \text{ hours} \times 5.7 \text{ lb/hr}) + (4 \text{ hours} \times 5.3 \text{ lb/hr}) = 135.2 \text{ lbs of NO}_x$
- Daily CO emissions from Solar turbine
 - $(20 \text{ hours} \times 7 \text{ lb/hr}) + (4 \text{ hours} \times 6.5 \text{ lb/hr}) = 166 \text{ lbs of CO}$

Natural Gas Fired Reciprocating Engines (EUs 1a, 2, 3, 4a, 6, and 12):

Monthly NO_x and CO emissions from EUs 1a, 2, 3, 4a, and 6, will be calculated by multiplying the monthly gas consumption by the worst-case NO_x and CO emission factors provided by the vendor or AP-42. The emission factor lookup table revises and rescinds Condition 23 of Minor Permit AQ0227MSS02 and Section 3, Table 2 of Minor Permit AQ0227MSS04.

Monthly NO_x and CO emissions from EU 12 will be calculated by multiplying the monthly hours of operation for EU 12 by the worst-case emission rates provided by the vendor.

Diesel Fired Reciprocating Engine (EU 13):

Monthly NO_x and CO emissions from EU 13 will be calculated by multiplying the monthly hours of operation for EU 13 by the worst-case emission rates provided by the vendor or AP-42.

Black-Start Generator (Diesel Fired) (Emission Unit 5):

- Monthly NO_x and CO emissions from EU 5 will be calculated by multiplying the monthly hours of operation for EU 5 by the emission rate. The emission rate used to calculate monthly NO_x and CO emissions is the highest emission rate for EU 5 regardless

of the load. The emission factor lookup table revises and rescinds Condition 23 of Minor Permit AQ0227MSS02 and Section 3, Table 2 of Minor Permit AQ0227MSS04. TDX proposes to monitor, report, and record the natural gas consumption from EUs 1a, 2, 3, 4a, and 6 (gas-fired generators) and diesel consumption from EU 5 (diesel-fired generators). Fuel consumption data will be recorded and used with the worst-case vendor emission factors to calculate the CO and NO_x emissions. The minor permit includes these requirements, inclusive of the pre-existing 300,000 gallon/year diesel fuel use restriction for EU 5 and EU 13 combined (see Section 2.2.1).

- TDX proposes to monitor, report, and record the annual hours of operation of EUs 12 and 13. Hours of operation data will be recorded and used with the worst-case vendor emission rates to calculate the CO and NO_x emissions. The minor permit includes these requirements, inclusive of a pre-existing annual operating restriction on EU 7 which is pro-rated and applied to new EU 12 (see Section 2.2.1).
- TDX proposes to monitor and record the hourly average electric loads on the Solar T-60 Turbines (EUs 10 and 11) and hourly ambient average temperatures at the TDX North Plant or the Deadhorse Airport to calculate the CO and NO_x emissions. The minor permit includes these requirements.

2.4 Requirements for a Title V Amendment Under 18 AAC 50.326(c)(2)

TDX requested that the Department incorporate this minor permit into the Title V operating permit as an administrative amendment in accordance with 18 AAC 50.326(c)(2). Since, TDX does not have an operating permit as described in Department Findings Section 1.4, Nos. 5 and 6 the request is moot. However, the Department included the applicable requirements of NSPS Subpart GG for turbines (EU IDs 10 and 11) in the minor permit requested by the Department's Compliance Group. The applicable requirements of 40 C.F.R. 60, Subpart A are included in Section 7 of the minor permit.

2.4.1 New Source Performance Standards (NSPS)

The NSPS provisions of 40 C.F.R. 60, Subpart GG apply to *affected facilities* defined therein as: all stationary gas turbines with a heat input at peak load equal to or greater than 10.7 gigajoules (10 MMBtu) per hour, based on the lower heating value of the fuel fired, which commences construction, modification, or reconstruction after October 3, 1977, except as provided in 40 C.F.R. 60.332(e) and (j).

The two stationary gas-fired Solar Taurus T-60 turbines (EU IDs 10 and 11) are subject to the requirements of NSPS Subpart GG. Each turbine was constructed after the October 3, 1977 applicability date; and each turbine has a rating of 5.2 megawatts, which is approximately 18.7 gigajoules (17.7 MMBtu).

The above notwithstanding, the NSPS provisions of 40 C.F.R 60, Subpart KKKK also apply to stationary combustion turbines. Moreover, Subpart KKKK applies to owners or operators of a stationary combustion turbine with a heat input at peak load equal to or greater than 10.7 gigajoules per hour (10 MMBtu/hr), based on the higher heating value of the fuel, which commenced construction, modification, or reconstruction after February 18, 2005. During minor permit application review, TDX clarified that EU IDs 10 and 11 are used turbines originally purchased by Williams Distributed Power from Solar Turbines and EU 10 and EU 11 were

manufactured on May 9, 2000 and April 13, 2000, respectively. TDX also indicated that Williams Distributed Power did not make extensive use of the turbines after their purchase, nor did they modify or reconstruct the turbines after their purchase. Therefore, the Department has determined that the requirements of NSPS Subpart GG are applicable to EU IDs 10 and 11; and NSPS Subpart KKKK does not apply.

The following summarizes the requirements of 40 C.F.R. 60, Subpart GG as applies to EUs 10 and 11:

40 C.F.R. 60.330, *Applicability and designation of affected facility*

40 C.F.R. 60.331, *Definitions*

40 C.F.R. 60.332, *Standard for nitrogen oxides*

40 C.F.R.60.332(a)(2). The nitrogen oxide standard for EU Nos. 10 and 11 is 181.5 ppmv @ 15% O₂. The standard was calculated according to 40 C.F.R. 60.332(a)(2) as follows: $STD - (0.0150 \times (14.4/11.9) + 0) \times 10,000$

40 C.F.R.60.332(c). The Permittee indicated that EU IDs 10 and 11 have a heat input at peak load of 59.8 MMBtu/hr.

40 C.F.R. 60.333, *Standard for sulfur dioxide*

40 C.F.R.60.333(a) or (b). Because NSPS Subpart GG allows either 40 C.F.R. 60.333(a) or (b) to comply with the NSPS Subpart GG sulfur dioxide standard, TDX requests that both options be included in the Title V permit for the DPP.

40 C.F.R. 60.334, *Monitoring of operations*

40 C.F.R.60.334(f) EU IDs 10 and 11 are lean premix stationary combustion turbines.

40 C.F.R.60.334(g)

40 C.F.R.60.334(h)

40 C.F.R.60.334(j)

40 C.F.R. 60.335, *Test methods and procedures*

40 C.F.R. 60.335(a)(1) or (a)(2) or (a)(3). TDX indicated that they may opt to use any of the three source testing methods that are specified for NO_x testing in 40 C.F.R. 60.335. TDX requested that the Title V permit allow the use of any of the three NO_x source-testing methods as specified in 40 C.F.R. 60.335.

40 C.F.R. 60.335(a)(4), (a)(5), and (a)(6)

40 C.F.R. 60.335(b)(1), (b)(2) and (b)(5)

40 C.F.R. 60.335(b)(8)

40 C.F.R. 60.335(b)(11)

40 C.F.R. 60.335(c)(1)

Notes:

- 1) The Permittee indicated that the requirements of 40 C.F.R. 60.332(k) do not apply to EU IDs 10 and 11 because these units do not have provisions for being fired with an emergency fuel.

- 2) The Permittee indicated that the provisions of 40 C.F.R. 60.334(i)(2) and (i)(3) do not apply to EU IDs 10 and 11 because these units will only burn natural gas that meets the definition of natural gas in 40 C.F.R. 60.331(u).
- 3) The Permittee indicated that the requirements of 40 C.F.R. 60.335(b)(9)(ii) and 60.335(b)(10)(ii) do not apply to EU IDs 10 and 11 because TDX is not claiming a fuel bound nitrogen allowance and will only burn natural gas, as defined in 40 C.F.R. 60.331(u), in EU IDs 10 and 11. Additionally, the requirements of 40 C.F.R. 60.335(b)(11) do not apply to EU IDs 10 and 11 because the provisions of 40 C.F.R. 60.335(b)(9) and 60.335(b)(10) do not apply.

The provisions of NSPS Subpart IIII apply to owners and operators of a stationary compression ignition (CI) internal combustion engine (ICE) where the CI ICE was constructed, reconstructed, or modified after July 11, 2005 and was manufactured after April 1, 2006. The provisions of NSPS Subpart JJJJ apply to owners and operators of a stationary spark ignition (SI) internal combustion engine (ICE) where the SI ICE was constructed, reconstructed, or modified after June 12, 2006 and manufactured on or after January 1, 2008, for lean burn engines with a maximum engine power greater than or equal to 500 hp and less than 1,350 hp. The provisions of NSPS Subpart IIII and NSPS Subpart JJJJ do not apply to EU IDs 12 and 13 because both engines were manufactured prior to the rule applicability dates.

According to TDX, EU ID 12 is a spark-ignition, lean burn natural gas fired-engine with an engine rating between 500 hp and 1,350 hp. The NSPS applicability date for spark-ignition, lean burn natural gas fired-engines with engine ratings between 500 hp and 1,350 hp is January 1, 2008. EU ID 12 was manufactured in January 1994 and is not subject to NSPS Subpart JJJJ because the unit was manufactured prior to the NSPS applicability date.

According to TDX, EU ID 13 is a compression-ignition, diesel-fired engine. The NSPS Subpart IIII applicability date for compression-ignition, diesel-fired engines that are not fire pump engines is April 1, 2006. EU ID 13 was manufactured in February 1996 and is not subject to NSPS Subpart IIII because the engine was manufactured prior to the NSPS applicability date.

2.5 Other Permit Conditions

The minor permit contains additional requirements as necessary to ensure that the Permittee will construct and operate the stationary source in accordance with 18 AAC 50, as described in 18 AAC 50.544(i). These requirements are listed in the minor permit under “Standard Conditions”.

3.0 Permit Administration

TDX requested that the Department incorporate the provisions of this Title I permit in to the operating permit as an administrative revision. However, TDX does not have an operating permit at this time. TDX’s initial operating permit AQ0227TVP01 expired on July 29, 2008. TDX failed to submit a timely application for an operating permit renewal in order for TDX to operate under a permit shield. Therefore, TDX’s request to incorporate the provisions of this Minor Permit AQ0227MSS05 is moot. See Section 1.4 (Department Findings), Item No. 6 for additional information regarding the compliance case associated with the failure to submit a timely application for an Operating Permit.

This minor permit is issued on the assumption that TDX does not have an operating permit. Therefore, TDX is authorized to operate under this minor permit upon issuance.

Appendix A

Emissions Netting Analysis to Confirm Minor Permit is not Triggered for PM-10 and SO₂ Under 18 AAC 50.502(c)

The Department evaluated the PTE calculations submitted by TDX to determine if the net increase in PM-10 and SO₂ emissions from this project (*i.e.*, AQ0227MSS05) would trigger minor permitting requirements under 18 AAC 50.502(c)(3). In the application, TDX calculated the PM-10 and SO₂ emissions assuming EU 5 will burn 0.08 MMgal/yr, EUs 12 and 13 will operate 500 hr/yr and all other units operate continuously. However, TDX has requested stationary source wide ORLs for NO_x and CO and no other individual limits. As such, TDX's PM-10 and SO₂ PTE estimates are incorrect. TDX should have considered operating scenarios for emission unit operation (while staying under the ORLs) that will have the highest emissions for PM-10 and SO₂. [Note: EU 5 and EU 13 will operate under a total diesel fuel use restriction of 300,000 gallon/year, and EU 12 will be restricted to 700 hours/year of operation (see Section 2.2.1). These unit-specific limitations were not requested by TDX, but have been retained by the Department in this minor permit for air quality protection purposes. The PM-10 and SO₂ emissions analysis discussed in this section account for these unit-specific restrictions. These restrictions along with the NO_x and CO ORLs ensure that the net increase in project PM-10 and SO₂ emissions is less than the minor permit thresholds of 18 AAC 50.502(c)(3) as described in detail below].

Evaluation of PM-10 Emissions Increase

The Department evaluated both the NO_x ORL and CO ORL to determine that, if TDX complies with these ORLs, then the net increase in PM-10 emissions from this project (*i.e.*, AQ0227MSS05) would not exceed 10 tpy. The Department determined that compliance with CO ORL is more restrictive in terms of the PM-10 PTE than compared with the NO_x ORL.

The permit limitations were first applied to the emission calculations as follows:

- EU 5 (and EU 13) was restricted to 300,000 gallon per year diesel. Since EU 5 has a higher PM-10 emission factor than EU 13, it was assumed that EU 5 could operate 18.178% (1592.357/8760 hrs/yr) of the time since its fuel consumption rate is 188.4 gallons per hour (300,000 gallons/188.4 gallons/hr = 1,592.36 hrs/yr) and EU 13 did not operate at all.
- Emissions for EU 12 were calculated based on a permit limitation of 700 hours of operation per year. The PM-10 PTE for all other emission units was based on 8,760 hours of operation.

With these applied permit limitations, the summation of the PM-10 PTE values is 17.76 tpy. The PM-10 PTE of this stationary source prior to this project was 13.8 tpy. As such, the net increase in the PM-10 PTE is less than 10 tpy.

Although it was not necessary to further evaluate the NO_x and CO ORLs of 242.6 tpy and 240.1 tpy, respectively, the Department completed the following evaluation to determine the correct assessable emissions for this stationary source.

The Department sorted the PM-10 PTE values for each unit in descending order. Starting from the top of the table (highest PM-10 PTE values) to the bottom (lowest PM-10 PTE values), the corresponding CO emissions were summed until the CO ORL was exceeded. The excess of CO emissions beyond the CO ORL was then calculated by subtracting the sum of CO emissions for

these units from the 240.1 tpy ORL. The allowable operating time for the last unit, for which the CO emissions were included in the summation, was then calculated (*i.e.*, 1 - (excess CO emissions/CO PTE for the last unit considered)). The calculated allowable operating time for the last unit was then multiplied by the PM-10 emissions for the last unit. This value was then added to the potential PM-10 emissions for all other units in the sorted list that preceded this last unit.

The results of the iterative analysis indicate that EUs 6, 1a, and 4a could operate 100% of the time and EU 5 could operate within its 300,000 gallon per year limitation (or 1,592.36 hrs/yr). However, EU 11 could only operate 34.77% of the time in order to ensure that the CO ORL was not exceeded. Based on this maximum operating rate for EU 11, the fuel restriction for EU 5, and an operating rate of 100% for EU 6, 1a, and 4a, the calculated PM-10 PTE is 11.77 tpy and the net increase of the PM-10 PTE from this project is -2.03 (*e.g.*, 11.77 tpy - 13.8 tpy = -2.03 tpy).

The CO ORL of 240.1 tpy is more restrictive in terms of the PM-10 PTE than compared with the NO_x ORL of 242.6 tpy, as such it is not necessary to evaluate the NO_x ORL. Compliance with the CO ORL ensures that the net increase in PM-10 emissions from this project is less than 10 tons.

Estimating VOC Emissions

The Department used a similar method as described for PM-10 emissions and calculated VOC emissions to be 101.50 tpy. The Department determined that EU 6, 10, and 11 could operation 100% of the time and that EU 1a could operate 36.27% before the CO ORL of 240.1 tpy would be exceeded. The CO ORL of 240.1 tpy is more restrictive in terms of the VOC PTE than compared with the NO_x ORL of 242.6, tpy as such it is not necessary to evaluate the NO_x ORL.

Based on this analysis the net increase of the VOC PTE from this project is -17.5 (*e.g.*, 101.50 tpy – 119.0 tpy = -17.5 tpy).

There is no minor permitting requirement for VOC emissions but the VOC emissions must be accounted for in the calculation for assessable emissions.

Evaluation of SO₂ Emissions Increase

The Department used a similar method as described for PM-10 emissions and calculated SO₂ emissions to be 15.51 tpy.

The Department determined that EUs 10, 11, 5, and 6 could operation 100% of the time and that EU 1a could operate 0.111% before the CO ORL of 240.1 tpy would be exceeded. The CO ORL of 240.1 tpy is more restrictive in terms of the SO₂ PTE than compared with the NO_x ORL of 242.6, tpy as such it is not necessary to evaluate the NO_x ORL.

Based on this analysis the net increase of the SO₂ PTE from this project is 5.61 (*e.g.*, 15.51 tpy – 9.9 tpy = 5.61 tpy).

This analysis shows that compliance with the stationary source CO ORL inherently limits the net increase in SO₂ emissions from this project to less than 10 tpy and therefore additional SO₂ limits are not required in the permit.

Conclusion

It is not necessary to consider the NO_x ORLs when determining whether or not the net increase in PM-10 and SO₂ emissions from this project are less than 10 tpy each because compliance with the CO ORL ensures that the net increase in PM-10 and SO₂ emissions are inherently limited to less than 10 tpy each.

Thus, based on this evaluation it is not necessary to add additional limits to the permit to ensure that the net increase in SO₂ and PM-10 emissions do not exceed the minor permit applicability thresholds in 18 AAC 50.502(c)(3).

Appendix B
Air Quality Modeling Review Report

Air Quality Modeling Review Findings Report
TDX NORTH SLOPE GENERATING, INC.
DEADHORSE POWER PLANT

EXECUTIVE SUMMARY

Enviroplan Consulting (Enviroplan) was retained by the Alaska Department of Environmental Conservation (Department) to review an April 16, 2009 minor source permit application submitted by TDX North Slope Generating, Inc. (TDX) for the Deadhorse Power Plant (DPP). The DPP stationary source consists of all emission units located at the North and South Plants. The North Plant is located about three miles northeast of the South Plant. TDX has requested approval to install and operate new fuel-combustion equipment at the DPP North and South Plants.

The NO_x emission increases associated with the DPP modification triggers the minor permit requirements in 18 AAC 50.502(c)(3). As such, TDX is required to demonstrate compliance with the NO₂ ambient air quality standard, per 18 AAC 50.540(c)(2)(A). TDX submitted the modeling analysis in their April 2009 application, with supplemental modeling information submitted on March 1, 2010.

TDX also requested under 18 AAC 50.508(6) a number of revisions to their existing permits. Per 18 AAC 50.540(k)(3), applicants must show the effect of these revisions. Minor Permit AQ0227MSS02 established unit specific restrictions for purposes of air quality protection of the NO₂ increment under 18 AAC 50.020(b). The restrictions include a total source diesel fuel use limit of 300,000 gal/year and an annual hourly operating restriction applicable to EU 7. TDX did not include a revised NO₂ increment analysis in their application. Therefore, the Department is planning to retain these ambient air provisions in Minor Permit AQ0227MSS05.

Enviroplan reviewed TDX's ambient air quality analysis and determined the analysis to be consistent with the EPA's *Guideline on Air Quality Models* and 18 AAC 50.215(b) - (e). Enviroplan finds that TDX's ambient analysis adequately shows the proposed DPP project will not cause or contribute to a violation of the Alaska Ambient Air Quality Standards (AAAQS) for NO₂ as provided in 18 AAC 50.010.

BACKGROUND

TDX plans to install and operate new fuel-burning equipment at the DPP. The project will include replacing diesel fuel fired EU 7 (black-start generator No. 12) with new natural gas fired emergency generator EU 12 at the South Plant; installing new diesel fired emergency generator EU 13 at the North Plant; and installing new Solar Taurus natural gas fired turbine EU 11 at the North Plant. New turbine EU 11 will be identical to existing North Plant turbine EU 10. The project also includes retaining EU 5 at the South Plant. Minor Permit AQ0227MSS04 had approved the decommissioning of EU 5, but TDX has determined that EU 5 is needed for purposes of EU 10 startup and black-start situations for reciprocating engines EUs 1a, 2, 3, and 4a.

The project requires a minor air quality control permit under 18 AAC 50.502(c)(3)(A) since the potential to emit of NO_x exceeds 10 tons per year (tpy), and TDX is required to submit an ambient NO₂ analysis per 18 AAC 50.540(c)(2)(A).

Due to the plan to retain EU 5, TDX requested the Department maintain their stationary source NO_x ORL (as a tpy limit) for continued PSD-avoidance purposes. While TDX proposed to demonstrate NO_x ORL compliance through source-wide emission unit fuel usage and operating hour monitoring; TDX requested the rescinding of prior unit-specific operating restrictions that

included a 300,000 gallon/year diesel fuel use limit and an annual hourly operating limit for EU 7. This notwithstanding, TDX failed to evaluate the effect (through modeling) of removing these permit restrictions on the NO₂ increment, which was previously done in support of Permit AQ0227MSS02. Therefore, the Department is denying TDX's request. Minor Permit AQ0227MSS05 retains the annual diesel fuel use restriction, applicable to EU 5 and EU 13; and the annual hourly operating limit, applicable to EU 12 (as a replacement for EU 7) on a pro-rated 700 hour per year bases. Therefore, the project does not trigger an ambient assessment under 18 AAC 50.540(k)(3).

TDX has conducted the requisite NO₂ ambient air quality analysis under 18 AAC 50.540(c)(2)(A), opting to use the screening-level analysis procedures and thresholds of 18 AAC 50.542(c)(2)(A). TDX applied a similar NO₂ ambient assessment screening demonstration in support of the North Plant's existing Solar Taurus turbine EU 10, as approved in Minor Permit AQ0227MSS03. TDX submitted the screening-level NO₂ assessment for this project with their application; however, the analysis only considered the two North Plant turbines. On February 22, 2010 the Department requested TDX augment their ambient demonstration to account for NO_x emissions (and ambient NO₂ impacts) attributable to new EU 13. TDX submitted the requested supplemental modeling information on March 1, 2010. The modeling analysis was conducted by Hoefler Consulting Group on behalf of TDX.

Enviroplan has conducted a review of the NO₂ ambient air analysis. The following sections of this report discuss Enviroplan's review and associated findings.

APPROACH

TDX used computer analysis (modeling) and computer-generated screening meteorological data to predict the NO₂ ambient air quality impacts. The Department does not generally allow the use of screening meteorological data for modeling multiple emission units. Such analyses do not readily assess overlapping plumes for dissimilar, non-collocated sources when the meteorological conditions change (*e.g.*, change in wind direction, stability class, etc.). Therefore, the use of screening meteorological data can underestimate the combined impacts from multiple emission units.

Enviroplan has considered the above issue and determined the screening-level approach used by TDX adequately accounts for potential air quality impacts for the DPP project, even though the project includes non-collocated emission units (*i.e.*, North and South Plant emission units). Enviroplan made the following observations in making this determination:

- An ambient air quality analysis was not conducted for the natural gas-fired generator (EU 12) that will replace EU 7. Although TDX indicated in their application that EU 12 will have lower potential emissions than EU 7, their claim was predicated on EU 12 operating 500 hours/year on an actual basis, *i.e.*, no permit restriction was proposed by TDX in their application; plus TDX did not consider the effect (through modeling) of removing the existing 250 hour/year restriction on EU 7. Therefore, since TDX plans to utilize EU 12 as a replacement-in-kind for EU 7, the Department intends to retain a pro-rated hourly operating restriction on EU 12 such that the related annual NO_x emission rate is equivalent to that of EU 7. The EU 12 pro-rated hourly operating restriction is 700 hours/year, determined as follows: the NO_x emission rate for EU 7 is 5.16 lb/hour (according to the 227CP01 application and TAR,); the NO_x emission rate for EU 12 is 1.80 lb/hour (according to the

AQ0227MSS05 application); and the 250 hour/year restriction on EU 7 is pro-rated to 700 hours per year for EU 12.

- An ambient analysis was not conducted for EU 5, which is retained by TDX at the DPP stationary source. The existing diesel fuel restriction established at 300,000 gallons/year in AQ0227MSS02 is carried-forward into this minor permit. This restriction is applicable to EU 5 and EU 13; therefore, there is no change to the NO₂ ambient modeling analysis for EU 5, as described in the TAR to AQ0227MSS02.
- An ambient air quality analysis was not initially conducted by TDX for EU 13 because TDX indicated EU 13 would have a lower potential to emit of NO_x than the two turbines combined (96 tpy without ORL). However, since the NO₂ AAAQS is an annual standard wherein TDX could operate the two turbines and one engine at any time during a given year; and the atmospheric release characteristics of the engine differ from the turbines, the Department requested TDX to provide a total North Plant NO₂ air quality modeling analysis (*i.e.*, EU 10, 11 and 13 combined). TDX provided the supplemental modeling results on March 1, 2010. TDX applied a 250 hour/year annual operating restriction on EU 13 (*i.e.*, multiplied the SCREEN3 results for EU 13 by 0.023589 (as 250/8760)). The annual operating limit is included in the minor permit for EU 13 for air quality protection purposes (along with the annual diesel fuel use limitation which applies to EU 5 and EU 13).

Regarding the first point indicated above, TDX previously conducted an NO₂ ambient assessment for the DPP to support approval of both Construction Permit 227CP01 and Minor Permit AQ0227MSS02. The TDX analyses demonstrated compliance with the AAAQS for NO₂, and it included EU 7 and the other South Plant emission units reflected in this minor permit. The demonstration of NO₂ air quality compliance will not change when EU 7 is replaced by EU 12, as discussed above.

With respect to the third point above, TDX assumed the two North Plant Solar Taurus turbines to be continuously operating and exhausting to the atmosphere from a single stack. Enviroplan deems the combining of identical turbine NO_x emissions through a single stack to be appropriate for the screening-level assessment under 18 AAC 50.542(c)(2)(A).

Based on the above, TDX determined the SIA for the North Plant (*i.e.*, EUs 10, 11 and 13). From the NO₂ ambient assessment conducted in support of Minor Permit AQ0227MSS02, TDX determined the 3,000 meter SIA for the South Plant would not overlap the SIA for the North Plant (*i.e.*, the South Plant will have no significant contribution or impact on North Plant predicted concentrations). The South Plant SIA will remain unaffected by this project since South Plant ambient air protection limitations are carried-forward in this permit. As such, TDX demonstrated ambient compliance by comparing the screening-level predictions for the North Plant (*i.e.*, combined NO₂ impacts for turbines EU 10 and 11, and engine EU 13) against the NO₂ threshold described in 18 AAC 50.542(c)(2), *i.e.*, 80 percent of the AAAQS, or 80 µg/m³. This project is not subject to additional ambient assessments under 18 AAC 50.540(k)(3), as discussed above.

Model Selection

There are a number of air dispersion models available to applicants and regulators. The U.S. Environmental Protection Agency (EPA) lists these models in their *Guideline on Air Quality Models* (Guideline). TDX used EPA's SCREEN3 model (version 96043) for the ambient

analysis. SCREEN3 is an appropriate model for this analysis. TDX used the current version of SCREEN3. TDX also used the EPA regulatory (default) mixing height and 10 meter anemometer height options in SCREEN3.

Averaging Periods

SCREEN3 provides 1-hour concentrations when estimating simple terrain impacts, and 24-hour concentrations when estimating impacts in complex terrain. These results must be scaled to the averaging period of concern. The scaling factors are listed in EPA's *Screening Procedures for Estimating the Air Quality Impact of Stationary Sources, Revised* (EPA-454/R-92-019). EPA also provides adjustments to the scaling factors for downwash dominated scenarios (which is the case for this ambient assessment).

TDX used the 1-hour to annual average scaling factor of 0.08 for converting the 1-hour SCREEN3 estimates into annual average estimates. The Department previously accepted this same factor (0.08) in TDX's screening-level ambient compliance demonstration conducted in support of Minor Permit AQ0227MSS03 for turbine EU 10. The Department stated the 0.08 value was appropriate since downwash was not a factor. Enviroplan did not review the assessment conducted in support of AQ0227MSS03, but noted that downwash is a factor in the AQ0227MSS05 assessments. EPA suggests a scaling factor of 0.1 be used when accounting for building downwash effects on a stack plume. Since TDX's screening model results show building downwash does affect the turbine (EU 10 and EU 11) and engine (EU 13) stack plumes, Enviroplan has applied the 0.1 averaging period adjustment factor to TDX's SCREEN3 model results.

Emission Rates and Stack Parameters

The assumed emission rates and stack parameters have significant roles in an ambient demonstration. Therefore, the Department checks these parameters very carefully.

TDX provided the assumed turbine stack parameters in their modeling report (provided as Appendix G of their April 2009 application); and engine stack parameters in their March 1, 2010 modeling supplement. The NO_x emission rates and stack parameters submitted by TDX are acceptable. However, the following parameters or assumptions warrant special comment.

Load Analysis

The maximum ambient concentration does not always occur during the full-load conditions that typically produce the maximum emissions. The relatively poor dispersion that occurs with cooler exhaust temperatures and slower part-load exit velocities may produce the maximum ambient impacts. Therefore, EPA recommends that part-load conditions be analyzed as well as full-load conditions.

TDX conducted a load analysis of the turbines by making separate SCREEN3 runs at 50-percent, 75-percent, and 100-percent load conditions using vendor-specified stack parameters. TDX also used the ambient temperature-weighted emission rates discussed in Section 1.3 of this TAR. For the 75-percent load scenario, TDX used the 80 percent load NO_x emission rates. The Department approved this same screening-level modeling approach in Minor Permit AQ0227MSS03 for Solar Turbine EU 10.

For EU 13, TDX provided SCREEN3 results for the 100% load scenario only. To ensure these results reflect the worst-case NO₂ impacts, Enviroplan conducted SCREEN3 modeling of EU 13 under part-load (75% and 50%) conditions using the Department's modeling guidance (*i.e.*,

Section 4.2.1 of *Modeling Review Procedures Manual, Updated October 13, 2006*). Enviroplan determined the 100% load scenario submitted by TDX to produce the worst-case (highest) NO₂ impacts.

TDX used the automated distance array option in SCREEN3 and assumed no terrain variation for the analysis. TDX also used the full meteorology option and rural dispersion parameters. This approach is consistent with the screening-level approach approved by the Department in Minor Permit AQ0227MSS03 for Solar Turbine EU 10.

Horizontal/Capped Stacks

The presence of horizontal stacks or stacks with rain caps requires special handling in a SCREEN3 analysis. EPA recommends that the plumes be characterized with an artificially small exit velocity (0.001 m/s) and an “equivalent diameter” to conserve the volume flow rate.³ This notwithstanding, the turbine stacks have vertical releases without fixed rain caps and were modeled as such by TDX. This configuration is consistent with the screening-level approach approved by the Department in Minor Permit AQ0227MSS03 for Solar Turbine EU 10. An unobstructed vertical stack configuration was also presented by TDX for EU 13.

Ambient NO₂ Modeling

The modeling of ambient NO₂ concentrations can sometimes be refined through the use of ambient air data or assumptions. TDX used the national default ambient NO₂-to-NO_x ratio of 0.75, as provided in the Guideline, to refine the estimated ambient NO₂ concentrations. The 0.75 ratio is appropriate for this analysis.

Ambient Air Boundary and Receptor Grid

For purposes of air quality modeling, “ambient air” means outside air to which the public has access. Ambient air typically excludes that portion of the atmosphere within a stationary source’s boundary that has restricted access.

TDX used the automated distance array option in SCREEN3 to generate prediction receptors. No elevations were assumed in the analysis. TDX established the ambient air boundary at 20 meters from the turbine and engine stacks. The 20 meter distance is equal to the minimum receptor distance allowed by the model when a source plume is affected by building downwash (*i.e.*, three times the lesser building dimension of height or projected width (*i.e.*, 6 meter building height as input by TDX to SCREEN3)). The maximum array distance specified by TDX was 2,000 meters. Enviroplan finds the maximum distance to be adequate for this demonstration since the SCREEN3 predicted concentrations decrease with increasing distance from the engine and turbines’ stacks.

Downwash

Downwash refers to conditions where nearby structures influence plume dispersion. Therefore, the modeling of downwash-related impacts requires the inclusion of dimensions from nearby buildings. When using SCREEN3, the dimensions are limited to a single building height, width and length. TDX used turbine building dimensions of 6 meters (height), 3.7 meters (minimum width) and 12.1 meters (maximum width) as input to SCREEN3. TDX indicated EU 13 will be

³ EPA Memorandum from Joseph Tikvart to Ken Eng, *Proposal for Calculating Plume Rise for Stacks with Horizontal Releases or Rain Caps for Cookson Pigment, Newark, New Jersey*, July 9, 1993.

located immediately adjacent to the turbine building and, therefore, applied the same building dimensions to the EU 13 modeling analysis.

TDX also applied the regulatory (default) cavity calculation option in SCREEN3. The same turbine building dimensions are used by SCREEN3 to determine cavity concentrations (if such are determined by the model to occur). This approach is appropriate.

DEMONSTRATION THRESHOLD

TDX has elected to conduct a screening-level NO₂ analysis to support the planned DPP modification project and this minor permit. For purposes of the screening analysis and this minor permit, the TDX ambient assessment must not exceed 80 percent of the ambient standard, per 18 AAC 50.542(c)(2)(A).⁴ The AAAQS for NO₂ is 100 micrograms per cubic meter (µg/m³). Therefore, the maximum NO₂ impact from a screening level analysis must not exceed 80 µg/m³ in order to demonstrate compliance with the NO₂ AAAQS.

RESULTS AND DISCUSSION

The maximum NO₂ impacts from the DPP North Plant (*i.e.*, identical Solar Taurus turbines EU 10 and EU 11, plus EU 13) are shown in **Error! Reference source not found.**, per unit operating load. The maximum impacts reflect the SCREEN3 predicted 1-hour concentrations multiplied by the EPA recommended averaging time adjustment factor of 0.1 and the ambient NO₂-to-NO_x ratio of 0.75.

Table 1 - Maximum DPP North Plant AAAQS Impacts

Air Pollutant	Avg. Period	Operating Load	Maximum Predicted Impact (µg/m ³) ¹			Significant ³ Impact Area (m)	Demonstration ³ Threshold (µg/m ³)
			Turbines (EU 10 & 11)	Engine (EU 13)	Total ² (EU 10, 11, 13)		
NO ₂	Annual	100	5.96	47.75	53.71	<1,000	80
		75	6.58	46.29	52.87	<1,000	80
		50	6.65	40.80	47.45	<900	80

1. Reflects annual average NO₂ concentrations determined as follows: 1-hour SCREEN3 predicted concentration for each unit multiplied by the EPA 1-hour to annual average conversion factor of 0.1 (for building downwash cases), and multiplied by the NO₂-to- NO_x ratio of 0.75.
2. Total predictions reflect maximum unit NO₂ concentrations without consideration of prediction location.
3. Reflects distance from the three emission units (as collocated sources) where the total predicted NO₂ concentration is less than 1 µg/m³.
4. From 18 AAC 50.542(c)(2)(A).

TDX has demonstrated that the maximum NO₂ impact for each load for the North Plant, including the new turbine EU 11 and new engine EU 13, does not exceed 80 percent of the AAAQS, as required under 18 AAC 50.542(c)(2)(A).

⁴ The 80-percent threshold in 18 AAC 50.542(c)(2)(A) is based on an assumption that the total worst-case offsite and background impacts are 20-percent of the AAAQS (when modeling SO₂ and NO₂ impacts). Therefore, compliance with the AAAQS will be assured if the maximum impact from the applicant's stationary source is less than 80-percent of the applicable AAAQS.

The results in **Error! Reference source not found.** also demonstrate that the DPP modification complies with 18 AAC 50.542(c)(2)(C) as follows. The radius of the SIA for the North Plant (Solar turbines plus engine EU 13) is less than 1,000 meters. TDX demonstrated in a previous ambient analysis for Minor Permit AQ0277MSS02 that the SIA for the existing DPP stationary source (South Plant) was approximately 3,000 meters. The distance between the DPP North and South Plants is about 5,000 meters. Therefore, the SIAs for the two plants do not overlap and the respective ambient impacts do not influence one another. Since the DPP modification will only result in a potential increase in ambient concentrations attributable to the North Plant (due to the installation of the second turbine EU 11, and new engine EU 13), the results of **Error! Reference source not found.** demonstrate compliance with the NO₂ AAAQS.

It is important to note that since ambient concentrations vary with distance from each emission unit, the maximum value represents the highest value that may occur within the area. The concentrations at other locations within the area are less than the values reported above.

Conclusion

On behalf of the Department, Enviroplan reviewed TDX's modeling analysis for the DPP modification project and concluded the following:

1. The NO_x emissions associated with operating the proposed emission units will not cause or contribute to a violation of the NO₂ AAAQS listed in 18 AAC 50.010.
2. TDX's modeling analysis fully complies with the showing requirements of 18 AAC 50.540(c)(2)(A).
3. TDX generally conducted their modeling analysis in a manner consistent with EPA's *Guideline on Air Quality Models*, and 18 AAC 50.215(b) - (e). Enviroplan did revise the 1-hour to annual averaging time adjustment factor used by TDX from 0.08 to 0.1, consistent with EPA screening guidance for downwash affected source plumes.

The Department developed conditions in the minor permit to ensure TDX complies with the NO₂ AAAQS. These conditions are summarized below.

1. Emission unit EU 7 (diesel fired black start generator No. 12) will be removed from the DPP stationary source (South Plant) and will be replaced by a new natural gas-fired emergency generator, EU 12. For purposes of protecting the NO₂ AAAQS and increment, this minor permit retains the EU 7 annual hourly operating limit which is now applied to EU 12 as a pro-rated limit of 700 hours per year.
2. New diesel-fired emergency generator EU 13 will be installed at the DPP stationary source (North Plant). EU 13 will be restricted to 250 hours per 12-month rolling period for purposes of NO₂ ambient air quality protection. Further, EU 5 and EU 13 shall continue to comply with the existing 300,000 gallon/year diesel fuel use limitation established for purposes of protecting the NO₂ AAAQS and increment.
3. Construct and maintain vertical, uncapped exhaust stacks for each turbine (EU 10 and 11) and new engine (EU 12 and EU 13). This condition does not preclude the use of flapper valve rain covers, or other similar designs, that do not hinder the vertical momentum of the exhaust plume. A similar requirement was previously established for the DPP as Condition 7 of Minor Permit AQ0227MSS02. The condition is carried-forward in this

minor permit and revised to include the two turbines and two engines and to delete reference to emission units removed from this stationary source.